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Unilateral Diaphragm Paralysis with COVID-19 Infection: A Case Report

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Introduction

- As the coronavirus disease-2019 (COVID-19) pandemic continues, unexpected long-term complications are emerging.
- One such complication is unilateral diaphragm paralysis which is easy to be neglected because the respiratory symptoms are usually subtle.
- It is usually recommended to monitor the simple chest radiograph, when there are lasting respiratory symptoms after a COVID-19 infection.
- Here, we report a case of a patient who had recovered from COVID-19 infection and incidentally found the unilateral diaphragm paralysis.

Case report

- A 76-year-old female was diagnosed with COVID-19 infection in March 2022.
- The patient had no medical issues except for benign hypertension.
- She fully recovered from COVID-19 infection with conservative treatment, and did not experience any respiratory symptoms.
- A chest radiograph performed prior to COVID-19 infection showed no abnormal findings including diaphragm elevation (Fig.1A).
- However, a simple chest radiograph performed in May 2022 during a routine medical checkup showed elevation of the right diaphragm (Fig.1B).
- This finding was also confirmed by a chest computed tomography scan in the coronal plane (Fig.1C).
- Pulmonary function test showed decreased respiratory function, with a forced vital capacity of 1,740mL (61%) and a forced expiratory volume in one second of 1,330 mL (65%).
- Some other tests were done to exclude other possible conditions affecting diaphragm function such as neurogenic syphilis, diabetes mellitus, trauma, mediastinal cancer and viral infection.
- The hemoglobin A1c was 6.3, no surgical or traumatic events had occurred, and the rapid plasma reagin test was negative.
- We performed an ultrasound of the diaphragm and a nerve conduction study of the phrenic nerve to investigate further. The compound muscle action potential of the right phrenic nerve was nearly absent (Fig.2A), while the left phrenic nerve was normal (Fig.2B).
- These electrodiagnostic studies confirmed right phrenic neuropathy.
- Ultrasonographic findings of the diaphragm (Fig.3A) showed that the left diaphragm had an excursion of 5.14 cm and 6.07 cm during rest and forced breathing, respectively, while the right diaphragm showed complete paralysis.
- The left diaphragm thickness fraction was 62%, and the right diaphragm thickness fraction was 0%. After 6 months, a follow-up diaphragm ultrasound showed that there was still no right diaphragm movement (Fig.3B).

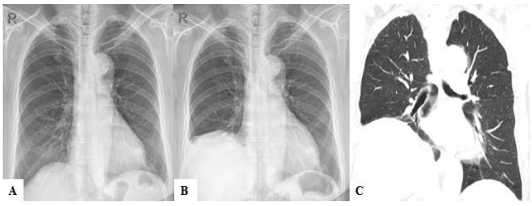

Figure 1. Chest radiograph (A) before and (B) after COVID-19 infection. (C) Chest computed tomography showed the elevation of the right diaphragm

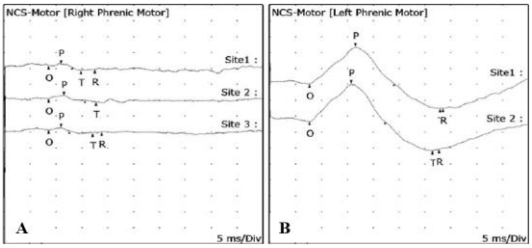

Figure 2. Nerve conduction study of the phrenic nerves. (A) The compound muscle action potential of the right phrenic nerve was nearly absent, (B) while the left phrenic nerve was normal.

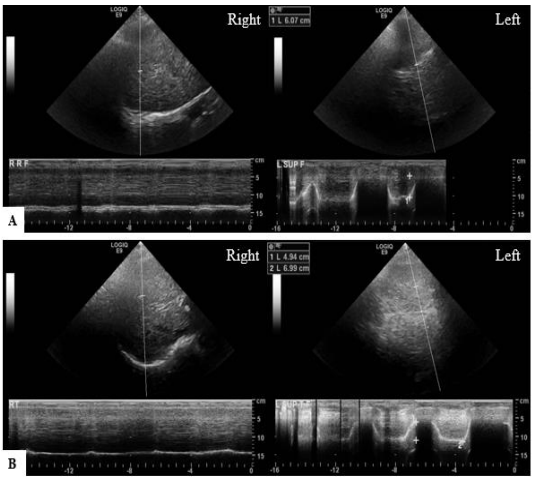

Figure 3. Diaphragm ultrasound study (A) first and (B) follow up study after 6 months. The right diaphragm showed complete paralysis while the left diaphragm movement was normal.

Conclusion

- In this case, the patient did not experience any respiratory symptoms, but unilateral diaphragm dysfunction was incidentally discovered at the routine medical checkup.
- After a COVID-19 infection, it is recommended that physicians investigate a chest radiograph to confirm the presence of diaphragm dysfunction, even if the patient does not report any respiratory symptoms.

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